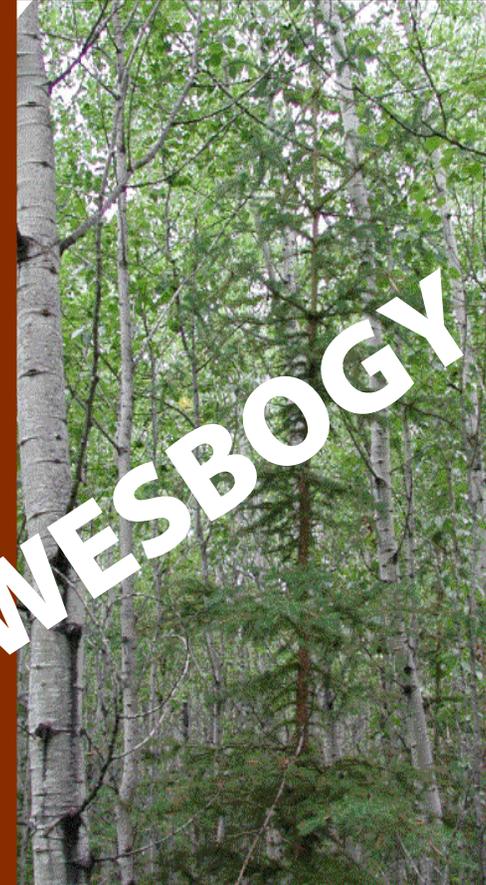

Annual Report 2000—2002

**Western Boreal Growth and Yield Cooperative
(WESBOGY)**

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**WESTERN BOREAL GROWTH AND YIELD ASSOCIATION
September 2003**

History of WESBOGY Meetings

Date	Sponsor
2003 Sept 9-11	Canadian Forest Products Ltd.
2002 Sept 9-11	Louisiana-Pacific Canada Ltd.
2001 Sept 9-11	Daishowa-Marubeni International Ltd.
2000 Sept 6-8	Weyerhaeuser Company, Drayton Valley
1999 Sept 23-25	Weyerhaeuser Company, Prince Albert
1998 Oct 7-9	Alberta-Pacific Forest Industries Ltd.
1997 Oct 7-9	British Columbia Ministry of Forests
1996 Nov 6-8	Daishowa-Marubeni International Ltd.
1995 Oct 11-13	Weldwood of Canada Ltd.
1994 Oct 12-14	Weyerhaeuser Company, Alberta Forestlands
1993 Nov 4	University of Alberta
1992 Oct 6-7	Weyerhaeuser Company, Grande Prairie
1991 Oct 24-25	Weyerhaeuser Company, Prince Albert
1990 Nov 22	University of Alberta
1989 Mar 15	Canadian Forest Service
1988 Nov 4	Canadian Forest Service
1998 Feb 4-5	Canadian Forest Service
1987 Mar 27	Canadian Forest Service

2000-2001 was a transition year during which the second WESBOGY agreement (2001-2005) was developed and ratified by the members. As part of this process, a summary of projects and accomplishments during the first 5-year agreement (1995-2000) was completed. This was also a time when our previous researcher, Dr Zhiming Wang, resigned to take another job. During that year, Zhiming completed a project entitled Modeling Crown Ratio with Growth (diameter and height) at the Individual Plot level.

2001-2002 was focused on the recruitment of our current researcher, Dr Mike Bokalo, who began duties in December 2001. Owing to the delay in getting him established, several new initiatives were delayed until 2002-2003.

2002-2003 included analysis of the Long Term Study (LTS) data up to 9 years for 4 of the participants and the preparation of a manuscript for publication. To accomplish this, considerable data cleaning was required and that activity continues. At the Fall 2002 meeting, Dr Steve Titus announced that he would resign as Principle Researcher at the end of December 2002. The new Principle Researcher, Dr Phil Comeau, took up his new position in January 2003. Dr Titus agreed to serve as a continuing member of the Steering Committee in the capacity as “Past Chair.”

During these three years development of MGM continued with MGM version 2002A released in November 2002. This version of MGM included results from all the projects completed during this time:

- ◆ Bergheim and Titus, Regional variants (BC, SK, and MB) and preliminary localization capability based on increment from plot data were incorporated into the MGM user interface and model
- ◆ Yang, completed PhD thesis: Mortality models for major boreal mixedwood species in Alberta
- ◆ Buckmaster, completed MSc thesis: Projecting height growth of understory *Picea glauca* in stands with an overstory dominated by *Populus tremuloides*
- ◆ Nunifu, completed PhD thesis: Calibrating the Mixedwood Growth Model (MGM) for lodgepole pine (*Pinus contorta*) and associated species in Alberta

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Appendices

Financial Summaries

2000-2001

Salaries:	\$84,333.82
Benefits:	\$6,356.92
Supplies & Services:	\$15,406.68
Telephone, Postage & Courier:	\$1,426.95
Travel and Hosting:	\$3,189.90
Repairs and Maintenance:	\$217.06
Rentals & Leases:	\$1,794.28
Capital Equipmt & Construction:	\$701.32
Indirect Costs:	\$20,469.93
Total	\$133,896.86

Note: The high expenditures in salaries and supplies (contract analysis of soil samples) are due to a mixing of the WESBOGY and two associated projects (DMI/Aitkin and LP/Rod). Support of graduate students was transferred out to other accounts in FY2001-2002.

2001-2002

Salaries:	\$11,825.65
Benefits:	\$2,645.38
Supplies & Services:	\$3,977.02
Telephone, Postage & Courier:	\$389.46
Travel and Hosting:	\$2,164.87
Rentals & Leases:	\$2,068.80
Capital Equipmt & Construction:	\$3,673.65
Indirect Costs:	\$17,604.00
Total	\$16,559.93

Note: Adjustments from FY 2000-2001, early departure of Dr. Wang, late arrival of Dr. Bokalo, and completion of student support lead to much lower expenditures in 2001-2002.

2002-2003

Salary and benefits	\$56,318.00
Supplies	\$1,761.46
Postage/telephone	\$322.70
Travel (Fall meeting and Bokalo to Western Mensurationists Meeting)	\$7,000.53
Repairs	\$301.54
University indirect costs	\$14,344.00
Total	\$80,048.23

8. Melanie Kalischuk: Site and competition effects on growth of white spruce in the understory of boreal mixedwood stands.
9. Dan MacIsaac: Spatial Aspects of Stand Dynamics in Aspen-Spruce Boreal Mixedwoods
10. Managing light and radiative frost occurrence in trembling aspen - white spruce stands (Janet Pritchard)
11. BC's Southern Interior G & Y Co-op (Steve Steams-Smith)
12. Simulating stand with FVS-BGC and extensions (Zhiming Wang)
13. MDFP (Steve Blanton)
14. DMI (Frank Oberle)
15. Mixedwood Management (Steve Luchkow)

Fall AGM 2002, Riding Mountain, MB, Sponsored by Louisiana-Pacific

1. Managing succession in Riding Mountain National Park (Wybo vanderSchuit, Parks Canada)
2. Stand structure and stand dynamics in boreal mixedwoods (Richard Kabzems, B.C. MOF)
3. Successional Pathways and Modeling (Norm Kenkel, Univ. of Manitoba)
4. SORTIE (Dave Coates, BC MoF)
5. Long-Term Study-results to date (Mike Bokalo)
6. Reseach Update (Steve Titus)
7. Student Presentations (Buckmaster and Nunifu)
8. Research Update (Phil Comeau)
9. Student Presentation (MacIsaac)
10. Riding Mountain CFS Studies (Derek Sidders)
11. Louisiana Pacific—Update on MS-69 Trials and Field Practices (Ken Broughton)

During the past 3 years the Western Boreal Growth and Yield Association has seen several changes. In 2002 Mike Bokalo took on the position of principal researcher, after Zhiming Wang left to take a position with the U.S. Forest Service. At the end of 2003 Steve stepped down and I was invited to take on the role of chair and Principal Researcher.

Ongoing work continues to build on the efforts of everyone who has been involved in WESBOGY since its inception. As time progresses, data from long-term study installations are becoming increasing valuable, and ancillary studies that will provide valuable information to guide free-to-grow and mixedwood management decisions are being established. Substantial work on MGM has been completed, with refinements that improve the performance and functionality of the model that have resulted from a number of studies by graduate students at the University of Alberta. Guest speakers at our fall meetings held in Peace River (September 2001) and Riding Mountain (September 2002) have provided useful and interesting links to research happening outside of our associaiton.



During the forthcoming year, we can look forward to even more activity as new project proposals are developed in collaboration with members and with the Alberta Mixedwood Management Association. These initiatives will help to continue progress with achieving our objectives.

I hope that you will find the work described in this report of interest. Please feel free to contact me, Mike or Steve if you would like any further information.

*Phil Comeau,
Chair, WESBOGY*

*Renewable Resources
University of Alberta
442 Earth Science Building
Edmonton, AB T6G 2E3
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Mission Statement

The purpose of the WESBOGY Association is to conduct research projects that contribute to the development and dissemination of growth and yield modeling technology for both natural and regenerated stands growing in the boreal mixedwood region, primarily aspen and spruce.

Goals

1. To develop and implement a program of research in the study of growth and yield focused on problems of interest to members of the Association.
2. To increase knowledge and awareness of growth and yield relationships, as they exist in western and northern Canada.
3. To foster communication, cooperation and exchange of information among the members as well as various agencies and groups concerned with management and development of boreal forests.
4. To focus on the dynamics of mixedwood stands of aspen and white spruce growing in the boreal forest. Basic relations to be studied will include establishment, ingrowth, growth, and mortality. While the major species of interest are aspen and white spruce, other species such as poplar, lodgepole pine, and black spruce will also be studied where sufficient data is available. In developing simulation models based on these relations, provision will be made for projecting stands subject to multiple interventions (treatments) through the life of the stand. Differences between Natural Subregions (Ecoregions) and site productivity will also be evaluated where there is sufficient data.
5. To encourage the establishment and continued monitoring of standardized permanent sample plots (PSPs) to quantify the effects of intensive forest management practices in natural and regenerated stands, and in general to coordinate the acquisition of high priority growth and yield data;
6. To identify, evaluate, rank and address areas of research which are: of regional importance, of shared mutual interest, and most effectively approached by the Association rather than by individual efforts;
7. To facilitate the dissemination of growth and yield data through the development of appropriate procedures, standards and databases for members' use.

Several Scientific reports were presented by inside speakers

1. Mixedwood Growth Model (MGM) update (Stephen Titus, University of Alberta);
2. The relations of spruce and aspen growth to tree density and site at juvenile stands - Long-term study data analysis and preliminary results (Zhiming Wang, University of Alberta);
3. Update in mortality model development (Yuqing Yang, PhD candidate, University of Alberta);
4. Update the height growth function on Lodgepole pine (Thompson Nunifu, U of Alberta, PhD Candidate);
5. G&Y under two-entry harvesting system (Darren Aitkin, MS Candidate, U of Alberta)
6. Forest site productivity in western Manitoba (Kenton Rod, MSc candidate, University of Alberta);
7. Spruce regeneration and growth under aspen overstorey (Glen Buckmaster, MS Candidate, University of Alberta);
8. Preliminary findings of ingrowth at boreal mixed forests (Satoshi Tasuhara, visiting professor, Nijata University, Japan)

Fall AGM 2001, Peace River, AB, sponsored by Diashowa-Marubeni International and Manning Diversified Forest Products

1. BC Monitoring (Eleanor McWilliams (J. S. Thrower and Associates)
2. Forest Growth Modelling in Alberta (Marty O'Byrne)
3. CFS Forest Practices Research Related to Mixedwood Establishment and Growth (Derek Sidders)
4. G & Y modeling (Oscar Garcia (UNBC, modelling))
5. How to manage I&D history, including monitoring (Peter Bothwell)
6. Long-term (aspen thinning and fertilization) and new (establishing mixedwoods) research trials in the Dawson Creek TSA (Chris Hawkins (UNBC, silviculture))
7. Yuqing Yang: Mortality modeling for major boreal mixedwood species in Alberta; Glenn Buckmaster: Growth rates and density of understory Sw under predominately Aw or Pb overstories (Student presentations (Yuqing Yang))

The Mixedwood Management Association has approached Steve Titus and WESBOGY with a proposition to aggressively pursue the development of MGM in several broad areas; improvement of existing relationships, addition of new functions to model treatment response, input of spatial competition indices and the development of spatial modeling capabilities. WESBOGY has agreed to join in with the MWMA to put forth a FRIAA proposal to fund the further development of MGM.

Mixedwood Growth Model (MGM)

As the transition to new research directions proceeds, the MGM user interface and code will be re-configured so that the model is contained entirely in the Excel and Visual Basic computational environment. This conversion will allow greater flexibility in model development and expansion as new information, relationships, and uses for the model are identified. This effort has already begun and will be managed by Dr Titus.

Appendices

Highlights of Spring and Fall Meetings

Fall AGM 2000, Edson, AB, sponsored by Weyerhaeuser (*Link to minutes on web site*)

Several scientific reports were presented by outside speakers

1. What the co-op is about – Lodgepole pine Growth and Yield Co-op (Dick Dempster, Lodgepole pine Growth and Yield Co-op)
2. Dynamics of competition in young aspen-spruce mixedwood stands (Phil Comeau, University of Alberta)
3. Fire Effects and Stand Structure - New Enhancements to the Forest Vegetation Simulator (Michael Van Dyck, USDA Forest Service, Forest Management Service Center)
4. Techniques for Validating and Localizing Growth and Yield Models (Shongming Huang, Alberta Land and Forest Service, Alberta);
5. Light transmission, productivity and free-to-grow standards for boreal mixedwoods (Victor Lieffers University of Alberta)
6. New research needs in mixedwood management (Tim Barker, DMI, Peace River, Alberta)

The following table lists objectives identified in the 2001-2005 Agreement. It also includes links to the overall goals of the WESBOGY Association.

5-Year Objectives

Related Goals

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. To maintain the WESBOGY long-term study designed to evaluate the effect of spruce and aspen density levels on the development of plantations from establishment to final harvest. Maintain and update the database for the WESBOGY long-term study. Complete 10-year analysis of data. Encourage new members to participate in the long-term study. 2. To develop growth and mortality relationships for other peripheral species and incorporate these new relationships into the MGM growth simulator. 3. To expand the scope of the MGM growth simulator as a tool for the development of managed stand yield projections for the major commercial tree species in the region 4. To maintain a website that will identify, evaluate and disseminate information on trends in growth and yield research; 5. To hold annual field and technical meetings for dissemination of information obtained from ongoing research projects as well as other speakers invited to address other relevant growth and yield issues 6. To expand the scope of WESBOGY activities by recruiting new members and seeking opportunities to augment the research component by alternative matching funding from granting agencies. 7. To identify and summarize regional PSP database standards and protocols for data exchange and use with regional growth models. 8. To identify and prioritize research needs and to initiate new projects as appropriate under the direction of the Steering Committee and members. | <p>Goal #1 and #5</p> <p>Goal #1 and #2</p> <p>Goal #4, #5, and #6</p> <p>Goal #3 and #7</p> <p>Goal #3 and #7</p> <p>Goal #1, #2, #3 and #6</p> <p>Goals #2, #3, #5 and 7</p> <p>Goals #1, #2 and #6</p> |
|---|---|

Membership Status 2000-2003

The annual assessment paid by members support activities of the association.

Agency/Company	2000	2001	2002
Alberta Sustainable Resource Development	X	X	X
Alberta-Pacific Forest Industries Inc.	X	X	X
British Columbia Ministry of Forestry	X	X	
Canadian Forest Products Ltd..	X	X	X
Daishowa-Marubeni International Ltd.	X	X	X
Louisiana-Pacific Canada Ltd., British Columbia	X	X	X
Louisiana-Pacific Canada Ltd., Manitoba	X	X	X
Manning Diversified Forest Industries Ltd.	X	X	X
Mistik Management Ltd.	X		
Northwest Territories Resources, Wildlife and Economic Development	X	X	X
Saskatchewan Environment and Resource Management	X	X	X
University of Alberta	X	X	X
Weldwood of Canada Ltd.	X	X	X
Weyerhaeuser Company, Alberta Forestlands	X	X	X
Weyerhaeuser Company, Saskatchewan Forestlands	X	X	X

Steering Committee Members

A Steering Committee, consisting of three members elected to the Committee at the annual Fall meeting, and the Chair and the Researcher Scientist sets policy, develops strategic objectives and priorities, reviews work plans, and adjusts annual membership assessments in light of planned activities, and the need for new projects.



- 2000 Titus, Wang, Behuniak, Niemi, Weeks
- 2001 Titus, Behuniak, Niemi, Nichol, Ewan
- 2002 Titus, Bokalo, Comeau, Behuniak, Niemi, Nichol, Ewan

Data Analysis

The collation of the remaining agency data will facilitate a more comprehensive analysis of data. Continued and extended analysis is planned in the areas of:

- aspen self-thinning
- comparison of our data to other aspen trials
- challenge some of the existing beliefs of aspen self thinning
ie. the -3/2 law of self-thinning
- better predictive breakup mortality model for use in MGM
- spruce and aspen growth
- improve juvenile growth and mortality models in MGM
- spruce growth response and growth allocation following spacing

Paper on the Natural Plot size Issue

The issues surrounding the need to use smaller plots for the natural aspen plots has limited, at least for the time being, the ability to analyze the data to its fullest potential. Although this is a phenomenon that has been discussed in statistics journals, the problems of plot size are not as widely known within the forestry community. There would be value in sharing this information.

Review and Revision of Existing Measurement Protocols

As the study matures, protocols must evolve to deal with unforeseen changes. Several measurement protocols have changed. We have adopted a new measurement interval for treated plots after age 10 (every even year) while continuing to measure the natural plots annually. Revision to condition codes will be dealt with in a revision of the field procedures manual to be released in 2003.

Successional Modeling

One of the identified objectives was to look at the development of a predictive model to aid in determining the successional pathway of spruce under an aspen canopy. Mike has been working on a proposal for a project that would begin gathering the necessary data to begin this type of modeling.

Initiatives with MWMA

Plans for 2003-2004 and Onward

Data collection and Storage

The first initiative will be the construction of a “master” database. This will involve the hiring of a dedicated person to obtain the most recent copy of the LTS data from each agency.

Steps:

- 1) convert in to Microsoft Access 2000 format
- 2) standardize the database structure and naming conventions
- 3) convert data to the standard format
- 4) develop an error checking routine and check all data
- 5) categorize data errors into 3 categories
 - a. missing data
 - b. wrong data
 - c. “typos” that are obvious and correctable
- 6) Prepare a database and report for each agency
 - a. duplicate all data columns (old and new) within the database
 - b. make corrections to data where errors are obvious
 - c. identify data in report and database form that cannot be corrected
- 7) return report and database to each agency for their approval and correction of uncorrected/errored data.



WESBOGY Tour—DMI Installations

2000-2001 was a transition year during which the second WESBOGY agreement (2001-2005) was developed and ratified by the members. As part of this process, projects and accomplishments during the first 5-year agreement (1995-2000) were summarized. This was also a time when our previous researcher, Dr Zhiming Wang, resigned to take another job. During that year, Zhiming completed a project entitled Modeling Crown Ratio with Growth (diameter and height) at the Individual Plot level.

2001-2002 was focused on the recruitment of our current researcher, Dr Mike Bokalo, who began duties in December 2001. Owing to the delay in getting him established here, several new initiatives were delayed until 2002-2003.

2002-2003 included new analysis of the Long Term Study (LTS) data at 9 years for 4 of the participants and the preparation of a manuscript for publication. To accomplish this, considerable data cleaning was required and that activity continues. During this time, priorities and projects were reviewed by the Steering Committee with the objective to define new directions and opportunities for the enhancement of both models and our understanding of stand growth and yield.

Research Projects

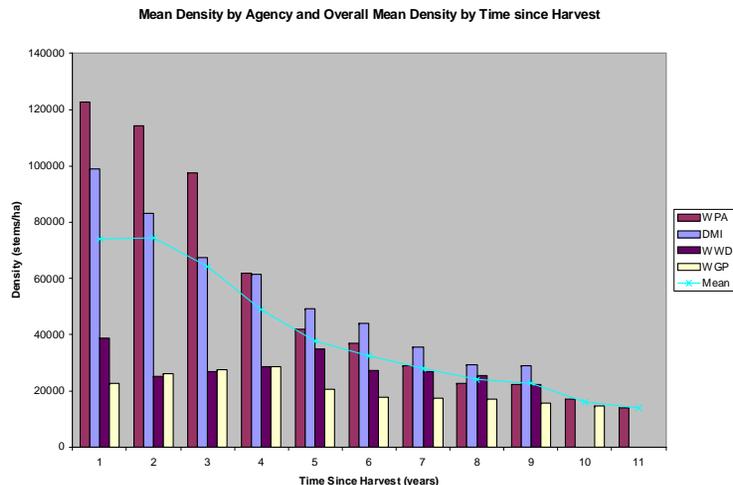
Long Term Study of Aspen/Spruce stand development

In 2002 the Long Term Study began to provide its first long term results. Analyses, using the four oldest installations, focused on the natural mortality or self-thinning of aspen as well as the aspen and spruce growth after the thinning of aspen.

The design of the Long-Term Study involves planting white spruce seedlings in recently clearcut areas where aspen regeneration had already been established. Spruce seedlings were planted in both the plot and buffer areas. For the first 5 years, vegetation was controlled by clipping or using plastic mulch mats within a 40 to 50 cm radius of the spruce. After 5 years, both the spruce and aspen were thinned to desired treatment densities. The objectives of the thinning were to achieve desired densities but retain potential crop trees at relatively uniform spacing. The study uses a randomized block design with each agency setting up and maintaining one block, comprised of two installations. Each installation consists of two replications of a series of 15 plots.

Data from 4 blocks indicate that regardless of initial establishment densities, the densities begin to converge after 11 years, with high rates of mortality associated with high starting densities and low mortality associated with low starting densities. Trends in aspen density for unthinned plots, by age, for four blocks of installations are presented below. A predictive model for annual survival probability has been fit and will be improved with the addition of more installations.

Three to four years after treatment, based on using the four largest DBH trees, there was no significant effect of the aspen thinning on top height, DBH, height increment or the slenderness coefficient. This comparison did not include the natural plots because they used much smaller plot size.



White spruce height growth during the first four years after the aspen spacing was unaffected by aspen density. Spruce RCD was significantly lower in the unspaced treatment compared to the spaced plots. The lack of observed differences in spruce RCDs, 3 to 4 years after treatment, between the four densities created by spacing may be related to the short time that spruce have had to respond to these changes, or to balancing of competitive and facilitative influences of these low densities of aspen. HDR of white spruce was sensitive to aspen density indicating that difference in spruce growth are beginning to appear, even 3 to 4 years after treatment.

Silviculture and Ecology

Several studies are underway examining aspects of competition between aspen and white spruce. Graduate student projects include:

- Dan MacIsaac (Ph.D.) - Spatial aspects of boreal mixedwood succession and stand dynamics (NCE-SFM funded)
- Janet Pritchard (M.Sc.) - Effects of radius of aspen removal and aspen height on light, frost incidence and growth of white spruce (NSERC and B.C. MOF funded).
- Cosmin Filipescu (Ph.D.) - Temporal dynamics of competition and effects of density reduction on growth of white spruce and associated microenvironmental factors (NSERC funded).
- Mihai Voicu (M.Sc.) - Spatial influences of aspen on microclimate and growth of spruce seedlings along the interface between young aspen stands and young spruce plantations (NSERC funded).

A variety of minor bug fixes and revisions have been completed on Phils' LITE model package, continued testing of the model is planned for 2003. During 2002 the Alberta Mixedwood Management Association granted 3 years of funding to support a study examining the influence of stand development on interactions between aspen and white spruce. This project, being conducted by Cosmin Filipescu, is examining how relationships between white spruce growth and aspen competition change with stand age. In collaboration with Doug Pitt (CFS), Dan MacIsaac (CFS), and Milo Mihajlovich (IFTech) a long-term study was established near Whitecourt in 2002 to examine the effects of herbaceous vegetation control and aspen stem density on boreal mixedwood stand development. This study is funded by Blue Ridge Lumber, Millar Western, Canadian Forest Products, Canadian Ecology Centre Forestry Research Partnership (Grant Forest Products), Monsanto Canada, Dow AgroSciences, Alberta Herbicide Task Force, Alberta Mixedwood Management Association, Ontario Ministry of Natural Resources (through the Spray Efficacy Research Group), Forest Protection Limited, and the Canadian Forest Service. Phil Comeau has also received a major equipment grant from the Canada Foundation for Innovation which provides valuable laboratory and microclimate equipment to support competition and stand dynamics research.

Mixedwood Growth Model (MGM)

Development of MGM has continued. MGM version 2002A was released in November 2002 and included results from all the projects completed during this time. Major revisions to diameter and height growth as well as mortality and juvenile development relationships were completed.

Major activities were:

2000

- Regional variants (BC, SK, and MB) and preliminary localization capability based on increment from plot data were incorporated into the MGM user interface and model

2001

- Rod, MSc thesis: Soil nutrient regime classification and soil-site relationships in aspen stands growing in Manitoba (Associated project)

2002

- Bokalo, presentation at Western Mensurationists Meeting, June 2002
- Yang, completed PhD thesis: Mortality models for major boreal mixedwood species in Alberta

2003

- Aitkin, completed MSc thesis: Early growth and yield response to various two-stage tending and harvesting treatments (Associated Project)
- Buckmaster, completed MSc thesis: Projecting height growth of understory *Picea glauca* in stands with an overstory dominated by *Populus tremuloides*
- Nunifu, completed PhD thesis: Calibrating the Mixedwood Growth Model (MGM) for lodgepole pine (*Pinus contorta*) and associated species in Alberta

Data from the four locations demonstrate that substantial variation can occur in initial aspen densities following clearcut harvesting of aspen dominated stands. Re-measurement data also show that densities begin to converge with the highest rates of mortality associated with high starting densities. Spacing of the aspen had no significant effect on spruce height at year 9 (3 to 4 years after spacing), but spruce root collar diameter (RCD) was significantly smaller in the unspaced compared to the spaced plots. The ratio of height to root collar diameter (HDR) for white spruce showed a significant and clear response to aspen density and increased with increasing aspen density.

Data Collection and Storage

2000 – 2002 saw a renewed commitment by the members to ensure the data was being collected, input and stored in a standard format. Problem areas identified during the analysis were discussed and it was decided that an action plan to deal with the problems would be a priority for 2003.

The field manual for long term study data collection is currently under revision. The updated version will be released in 2003.



WESBOGY PLOT—Aspen (4000 Stems/ha)
—Spruce (500 Stems/ha)

Natural Plots – Biased Estimates Caused by Smaller Plot Size

Analysis of long term study data brought plot size issues to the forefront. The study design calls for the natural plots to begin by using small 1m x 1m plots, then progressing to 2m x 2m, 5m x5m and finally the full plot size of 20m x 20m. This was done due to address problems with using large plots where starting densities were extremely high. A trial was set up in cooperation with Weyerhaeuser, Grande Prairie to determine if there was bias caused by plot size. The results clearly showed that comparisons between treated and untreated aspen plots are biased.



Riding Mountain Annual Meeting 2002



Spruce Below Unthinned Aspen

Long Term Study Members and Measurement Schedule									
Company or Agency	File name code	Site	Select	Layout	Plant	Meas	Year (Remeas)	Contact Person	
Alberta Sustainable Resource Development	AFS	Med	1991 2001	1992 2001	1992 2001	1992 2001	2002(10)	Dave Morgan (780) 422-5295 Daryl Gilday (780) 422-5257	
Alberta-Pacific Forest Industries Inc.	ALP	High Med	1994 1994	1995 1995	1995 1995	1996 1996	2002(5) 2002(7)	Dave Cheyne (780) 525-8261	
Canadian Forest Products Ltd.	CFR	High Med	1999 2001	2000 2001	2000 2001	2000 2001	2002(3) 2002(3)	Dwight Weeks (780) 538-7745	
Daishowa-Marubeni International Ltd.	DMI	High Med	1991 1991	1998 1998	1998 1998	1998 1998	2002(11) 2002(11)	Florance Niemi (780) 634-7048/	
Louisiana-Pacific Canada Ltd., Manitoba	LPC	High Med	1997 1997	1998 1998	1998 1998	1998 1998	2002(4) 2002(4)	Ken Broughton (204) 734-4102	
Louisiana-Pacific Canada Ltd., Dawson Creek	LPD	High Med	2000 2000	2001 2001	2001 2001	2001 2001	2002(1) 2002(1)	Christy Nichol (250) 782-3302 - ext 223	
Northwest Territories Resources, Wildlife and Economic Development	NWT	High Med	1993 1993	1993 1993	1993 1993	1993 1993	2002(10) 2002(10)	Lisa Smith (867) 874-2009	
Weldwood of Canada Ltd.	WWD	High Med	1991 1991	1992 1992	1992 1993	1992 1993	2002(11) 2002(10)	Thomas Braun / Sharon Meredith (780) 865-8189	
Weyerhaeuser Company, Alberta Division (Grande Prairie)	WGP	High Med	1991 1991	1991 1991	1991 1991	1991 1991	2002(12) 2002(12)	Greg Behuniak (780) 539-8207	
Weyerhaeuser Company, Saskatchewan Division	WPA	#1High #1Med #2High #2Med	1990 1990 1992 1992	1990 1990 1992 1992	1990 1990 1992 1992	1990 1990 1992 1993	2002(13) 2002(13) 2002(12) 2002(11)	Michael Leblanc (306) 953-5154	